

plant, the leaves broadly lanceolate, subacute, glabrous except on the veins and with petioles about 15 mm. long, and the bracts are ovate with more and finer serrations. *A. Seibertii* has longer pilose stems, petioles, and inflorescence rachis, much larger ovate leaves, with finer and more abundant pubescence, and the bracts are much broader.

Chicago Natural History Museum Herbarium,
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The University of Texas Herbarium,
Austin, Texas.

NOTES ON PACIFIC COAST MARINE ALGAE

G. J. HOLLENBERG

Data concerning the distribution of marine algae on the Pacific Coast of North America are found chiefly in the various papers of Setchell and Gardner and in the more recent works of Smith (1944) and Dawson (1946). In the present paper the known range of a number of species is extended as a result of collections by the writer extending over a period of years. Unless otherwise indicated, the place records are from the coast of southern California and collection numbers are those of the writer.

CHLOROPHYCEAE

ULVELLA SETCHELLII Dangeard, south of Redondo Beach, January, 1936, 1249; Corona del Mar, March, 1938, 2243b. This species, previously reported from Pacific Grove on the coast of central California (see Smith, 1944), is probably widely distributed along the coast. In both of the above collections as well as at various other times, this plant was found endophytic in the outer wall of *Amplisiphonia pacifica* Hollenberg, although it is apparently not limited to this host. Dangeard (1931) reported the Californian material of this species as growing in or on the wall of *Laurencia* sp. Observations on living material and paraffine sections indicate that the Pacific Coast plant is endophytic, except in the very early stages of its development. The endophytic habit might be considered as reason for questioning the propriety of this generic designation.

RHIZOCLONIUM RIPARIUM (Roth) Harvey, Corona del Mar, May, 1936, 1386; Balboa Harbor, December, 1936, 1928.5. Previous records are from Carmel along the coast of central California and northward (Setchell and Gardner, 1920). In the case of the first of these collections the plant formed extensive brownish masses on rocks in the midlittoral zone.

PHAEOPHYCEAE

ECTOCARPUS CHANTRANSIOIDES S. & G., Corona del Mar, October, 1942, 3288. This plant, which was found at least twice in this general locality, seems not to have been recorded since first discovered by Setchell and Gardner (1925). It forms abundant brown hemispherical cushions several millimeters in diameter on boulders in the middle littoral zone. Among 30 cushions examined, nearly all bore plurangia, but no unilocular sporangia were found.

ECTOCARPUS CYLINDRICUS Saunders, on *Halidrys*, Corona del Mar, November, 1936, 1600; on *Gelidium* and *Eisenia*, La Jolla, December, 1936, 2028a, 2028b; on the stipe of *Eisenia*, Corona del Mar, December, 1939, 3051. Although fairly common along the coast of southern California, this plant was previously known only from the type collection obtained by Saunders (1898) at Pacific Grove, along the coast of central California. However, *E. cylindricus* f. *codiophilus* S. & G. has been collected by Dawson (1945b) at La Jolla. *Eisenia* seems to be the commonest host. In one instance the *Ectocarpus* formed a patch two centimeters across.

DICTYOPTERIS JOHNSTONEI Gardner, from a large tide pool at medium high tide level on exposed rocky shore several miles south of Redondo Beach, October, 1935, 1021. This specimen is 37 cm. high. Gardner's fragmentary specimen, the only one previously known, was only 7 cm. high. The present specimen has a stupose base as anticipated by Gardner's account (1940). The stipe is more prominent (5 cm. long) than in the type specimen and the main axes are much less branched and decidedly percurrent. A collection made from a high tide pool at Corona del Mar, November, 1934, 583, seems to belong here also, although a few of the frond divisions are as much as 5 mm. wide.

RHODOPHYCEAE

GONIOTRICHUM CORNU-CERVI (Reinsch) Hauck, on *Herposiphonia* sp., Santa Cruz Is., April, 1936, 1339. Previously reported for the Pacific Coast by Kylin (1925) from the vicinity of the Biological Station at Friday Harbor, Washington.

ERYTHROTRICHIA PULVINATA Gardner, on the usual host, *Codium fragile* Suhr., Emerald Bay, Laguna Beach, February, 1935, 649.5. Previously known only from the Monterey Peninsula (Smith, 1944).

ERYTHROCLADIA SUBINTEGRA Rosenvinge, from Santa Cruz Island, April, 1936, 1367. Previously reported as far south as Monterey (Kylin, 1941), recently from Baja California, Mexico (Dawson, 1945c), and probably the plant referred to without name by Dawson (1944a, p. 251) as occurring in the Gulf of California. The plant is locally common on various algae along with *E. irregularis* Rosenvinge.

RHODODERMIS ELEGANS Crouan, was found growing on the stipe of *Cystoseira osmundacea* (Menz.) Ag. south of Redondo Beach, October, 1935, 1049; and on the same host at White's Point, San Pedro, November, 1933, 330. This plant was not previously known south of Monterey, where it is reported as occurring by Smith (1944). It is of frequent occurrence along the coast of southern California.

CRUORIA PACIFICA Kjellman (?), on shells of turban snails, *Tegula* sp., Corona del Mar, October, 1935, 1065; on rocks, Laguna Beach, December, 1935, 1170. This species was previously reported only from Alaska (Kjellman, 1889), however, it is very imperfectly known and might well prove to belong to another genus. The plants from southern California have zonate tetrasporangia and clearly belong to the genus *Cruoria*, but cannot at present be identified with Kjellman's species with certainty.

CHOREONEMA THURETI (Bornet) Schmitz, collected at Corona del Mar, December, 1937, 2231. The writer has collected this plant a number of times along the coast of southern California. It has been previously reported from Laguna Beach by Guernsey (1912), from Guadalupe Island off the coast of Mexico by Setchell and Gardner (1930), and from the coast of Ecuador by Taylor (1945).

GRATELOUPIA ABBREVIATA Kylin, Santa Catalina Island, April, 1935, 762; Point Vicente, near Redondo Beach, July, 1938, 2339; Laguna Beach, May, 1941, 3176. This plant was previously reported from La Jolla by Kylin (1941). It seems to be relatively common at certain seasons near high tide level on large wave-swept rocks near Laguna Beach, where it has been collected a number of times.

PETROCELIS FRANCISCANA S. & G., White's Point, San Pedro, October, 1938, 2376. This species was previously reported as far south as San Luis Obispo County (Smith, 1944).

GARDNERIELLA TUBIFERA Kylin, near Santa Monica, July, 1935, 1279. Until Dawson (1945c) reported this species from two points on the coast of Baja California, it had been recorded only from the Monterey Peninsula (Smith, 1944).

HYPNEA CALIFORNICA Kylin, cast ashore near Santa Monica, July, 1935, 882. This plant was previously reported only from the type locality at La Jolla (Kylin, 1941), and from Guerrero, Mexico (Taylor, 1945).

GIGARTINA PAPILLATA (Ag.) J. Ag., White's Point, San Pedro, October, 1938, 2390. Until Dawson (1945c) reported this species from Punta Descanso, Baja California, Mexico, it had been recorded only as far south as Carmel Bay (Smith, 1944).

RHODOGLOSSUM PARVUM Smith and Hollenberg, from Laguna Beach, March, 1936, 1295 and March, 1937, 2065. This species was known previously only from the Monterey Peninsula (Smith and Hollenberg, 1943).

BINGHAMIELLA FORKII Dawson, on corallines, Laguna Beach, March, 1935, 658 (tetrasporic); on *Gelidium* sp., cast ashore near the isthmus, Santa Catalina Island, April, 1935, 787 (cystocarpic); on corallines, Laguna Beach, December, 1936, 1935a. This plant was previously known only from the type locality, La Jolla (Dawson, 1944b).

FAUCHEA MEDIA Kylin, Santa Cruz Island, April, 1936, 1365; Laguna Beach, March, 1936, 1293. This plant was previously known only from the Monterey Peninsula (Smith, 1944).

CALLITHAMNION PIKEANUM var. PACIFICUM (Harv.) S. & G., Point Magu, Ventura County, March, 1935, 738. This variety was reported by Gardner (1927) as occurring from the Straits of Juan de Fuca northward.

CERAMIUM GRACILLIMUM Griffiths and Harvey, on corallines, Laguna Beach, December, 1936, 1943. This plant has been collected frequently at this locality on large wave-swept rocks near high tide level. It is similar to if not identical with a plant reported by Setchell and Gardner (1930) from the Revilla Gigedo Islands under the name *C. transversale* Collins & Hervey. Dawson (1944a) identified as *C. gracillimum* a plant which he collected in the Gulf of California, but on account of the different habitat of the local plant the writer suspects that it may ultimately prove to be distinct from the plant described by Griffiths and Harvey.

CERAMIUM SINICOLA var. INTERRUPTUM (S. & G.) Dawson, Laguna Beach, November, 1935, 1103; Laguna Beach, December, 1936, 1932; on oyster shells, upper Balboa Harbor, December, 1936, 1927. This species was not previously known north of the type locality, Ensenada, Baja California, where it was first reported by Setchell and Gardner (1924).

CERAMIUM PROCUMBENS S. & G., Redondo Beach, August, 1934, 468.5; from near Scripps Institution, La Jolla, December, 1936, 1972, 2035. This species has not been reported since originally described by Setchell and Gardner (1924) from material collected in the Gulf of California. It seems common as an epiphyte along the coast of southern California.

GYMNOTHAMNION ELEGANS (Schousboe) J. Ag., Laguna Beach, November, 1935, 1101; Corona del Mar, January, 1943, 3305. This plant was previously reported from the Revilla Gigedo Islands by Setchell and Gardner (1930). It is of frequent occurrence on rocky coasts along the coast of southern California.

PTILOTA FILICINA (Farl.) J. Ag. This plant occurs in the Dimmick collection from Santa Barbara. The Monterey Peninsula is given by Smith (1944) as the southern limit of its known range.

ANISOCLADELLA PACIFICA Kylin, from Laguna Beach, October, 1935, 1055 (male and sterile specimens); from near Santa Monica, December, 1935, 1197, 1198 (male and cystocarpic); Corona del Mar, February, 1940, 3089 (tetrasporic); Laguna Beach, November, 1942, 3290 (cystocarpic and tetrasporic). Until Dawson

(1945c) reported this plant from the coast of Baja California, Mexico, it had been known only from the Monterey Peninsula (Smith, 1944). Examination of isotype material from the Monterey region leaves no doubt that Kylin's plant is the same as those encountered more frequently farther south. The development of the secondary cell rows at the tips of the blades, with alternate emphasis in growth of the secondary cell rows on either side of the midrib, as described by Kylin (1941), is very characteristic. Cystocarpic and antheridial plants seem not to have been previously described. The cystocarps are commonly in pairs on either side of the midrib near the middle of the blade as far as length is concerned, but may also occur singly, and less frequently three may occur together on one blade. Antheridial areas usually occur as a single and relatively large pair near the tip of the blade.

DASYOPSIS DENSA G. M. Smith. A specimen in the collection of Dr. L. N. Dimmick, which is housed in the Santa Barbara Museum of Natural History, is probably this plant. It was previously known only from the Monterey Peninsula (Smith, 1944).

POGONOPHORA CALIFORNICA J. Ag., Laguna Beach, February, 1935, 644. This plant was described by J. Agardh (1890) from Santa Barbara. It was collected by Gardner (no. 2506) as far north as Bodega Bay in Marin County. It was also collected by Dawson (1945b) at La Jolla and by Dawson (1945c) from Punta Descanso, Baja California, Mexico. It is of frequent occurrence along the coast of southern California.

STROMATOCARPUS GARDNERI Setchell, on *Pterosiphonia dendroidea* (Mont.) Falk., Laguna Beach, March, 1936, 1289 (male, tetrasporic, and cystocarpic). The type collection was from near Santa Monica, where the plant was parasitic on *Pterosiphonia Baileyi* (Harv.) Falk. (see Setchell, 1923). Until Dawson (1945a) reported this plant from La Jolla, it was not recorded as having been collected since the type collection was made.

CHOREOCOLAX POLYSIPHONIAE Reinsch, parasitic on *Lophosiphonia villum* (J. Ag.) S. & G., Laguna Beach, December, 1937, 2208. Until Dawson (1945c) reported this plant from Baja California, Mexico, it had been known on the Pacific Coast of North America only from Sitka, Alaska (Saunders, 1901), and from the Monterey Peninsula (Smith, 1944). The writer has collected it several times on the coast of southern California.

HERPOSPHONIA TENELLA (Ag.) Naeg., south of Redondo Beach, July, 1935, 981 (tetrasporic); Santa Catalina Island, April, 1935, 834; Corona del Mar, October, 1937, 2146 (cystocarpic); Laguna Beach, December, 1936, 1929.5; Redondo Beach, October, 1935, 1050. This species is widely distributed. It was previously reported for the Pacific Coast of North America by Dawson (1944a) from the Gulf of California. It is locally quite common among other mat-forming algae in the upper tide level. Sometimes on spray-covered rocks in shallow tide pools it occurs by itself, in

which case branching is sparse and it spreads horizontally on the rocks, forming thin patches several centimeters in diameter. The cystocarps are terminal or subterminal on the determinate branches as described by Børgesen (1918) but the branch is not continued as a slender projection as shown in his figure. In one case the plant seemed to lack trichoblasts entirely, but usually there is a brief but distinct tuft of widely branching trichoblasts at the tips of the determinate branches. Rhizoids arise at the distal ends of the pericentral cells as described by Børgesen. In the writer's experience, this seems to be a characteristic feature of the genus.

HERPOSIPHONIA SECUNDA (Ag.) Naeg., from near Santa Monica, April, 1934, 443.1. This species seems not to have been previously reported from the Pacific Coast of North America. Some investigators are of the opinion that this plant should be considered as a variety under the preceding species. Børgesen (1918), who considers it as a separate species, depends chiefly on certain differences in the structure of the antheridial branches. The latter structures were not found in the local plants but the sequence of origin of determinate branches indicates that the plants belong to this species.

PTEROSIPHONIA CALIFORNICA Kylin, Santa Catalina Island, April, 1935, 808; near Ferry Wharf, Oakland, Alameda County, California, April, 1937, 2074; Corona del Mar, November, 1935, 1110. This plant was previously reported only from San Diego and La Jolla by Kylin (1941), who did not observe tetrasporic plants. The tetrasporangia are of the usual sort, occurring one per segment in the ultimate branchlets. This plant was collected by Gardner (no. 2480) from rocks three miles west of Santa Monica as early as March, 1912, as indicated by specimens in the herbarium of the University of California at Berkeley.

POLYSIPHONIA EASTWOODAE S. & G., Cabrillo Beach, San Pedro, July, 1940, 3103. This collection seems to belong with *P. Eastwoodae*, an entity which is possibly too close to *P. Snyderae* Kylin, but which must be kept distinct at present on account of the difference in the basal attachment. *P. Eastwoodae* was inadvertently omitted from the list of tetrasiphonous species treated in a previous paper (Hollenberg, 1942).

POLYSIPHONIA SNYDERAE var. *INTRICATA* Hollenberg, from rocks in the middle littoral zone, Corona del Mar, October, 1942, 3284. This plant is a dwarf form of the variety and was found associated with other mat-forming algae. The variety was previously known only from Sonora, Mexico.

LAURENCIA DIEGOENSIS Dawson, Corona del Mar, October, 1934, 496. The writer has collected this plant a number of times along the coast of southern California. In his original description Dawson (1944c) points out that the plant occurs farther north than the type locality, La Jolla. It is a very distinctive plant as much

as 22 cm. high. A characteristic feature not pointed out by Dawson is the unilateral position of the male conceptacles. There may be as many as four of these conceptacles bulging prominently on the adaxial side of the ultimate ramuli.

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ON TWO PERENNIAL CAESPITOSE LEPIDIUMS OF WESTERN NORTH AMERICA

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Among the known North American species of *Lepidium*, *L. nanum* S. Wats. stands out as strikingly different in habit from all others. It is a low, matted plant with many caudex branches each terminated by a dense rosulate cluster of tiny leaves. The species has a well-developed taproot system that often penetrates the soil to depths of a foot or more. It grows at relatively low elevations in northern Nevada. As Hitchcock (1936) remarked, plants of this species are "more suggestive of *Draba* than of *Lepidium*." In the past, speculation as to the genetic relationships of *L. nanum* inevitably lead to a comparison of it with species of similar habit of the high Andes of South America. For example, Thellung (1906) expressed the opinion that the Andean *L. Meyenii* Walp. was probably a relative of *L. nanum*.

As long as *L. nanum* remained the only species of its type known from North America, it was justifiable to try to link it up with such remotely situated species as those of the South American continent. In fact, no obvious alternative existed because there has been no basis for connecting *L. nanum* with any other North American species of the genus. However, the recent discovery of a new species from Idaho¹ has supplied a probable connecting link between *L. nanum* and other perennial North American species. The new species is caespitose and possesses a very thick taproot (pl. 22, fig. 1). It stands in an intermediate position morphologically between *L. nanum* and such other

¹ Professor Ray J. Davis discovered fruiting material of the new species in June, 1946, returning to the same location in May, 1947, for flowering specimens.

EXPLANATION OF FIGURES. PLATE 22.

PLATE 22. *LEPIDIUM DAVISII*. FIG. 1, a plant from the type sheet. It is 16 cm. wide. FIG. 2, enlarged infructescence. The siliques are 3-3.5 mm. long.